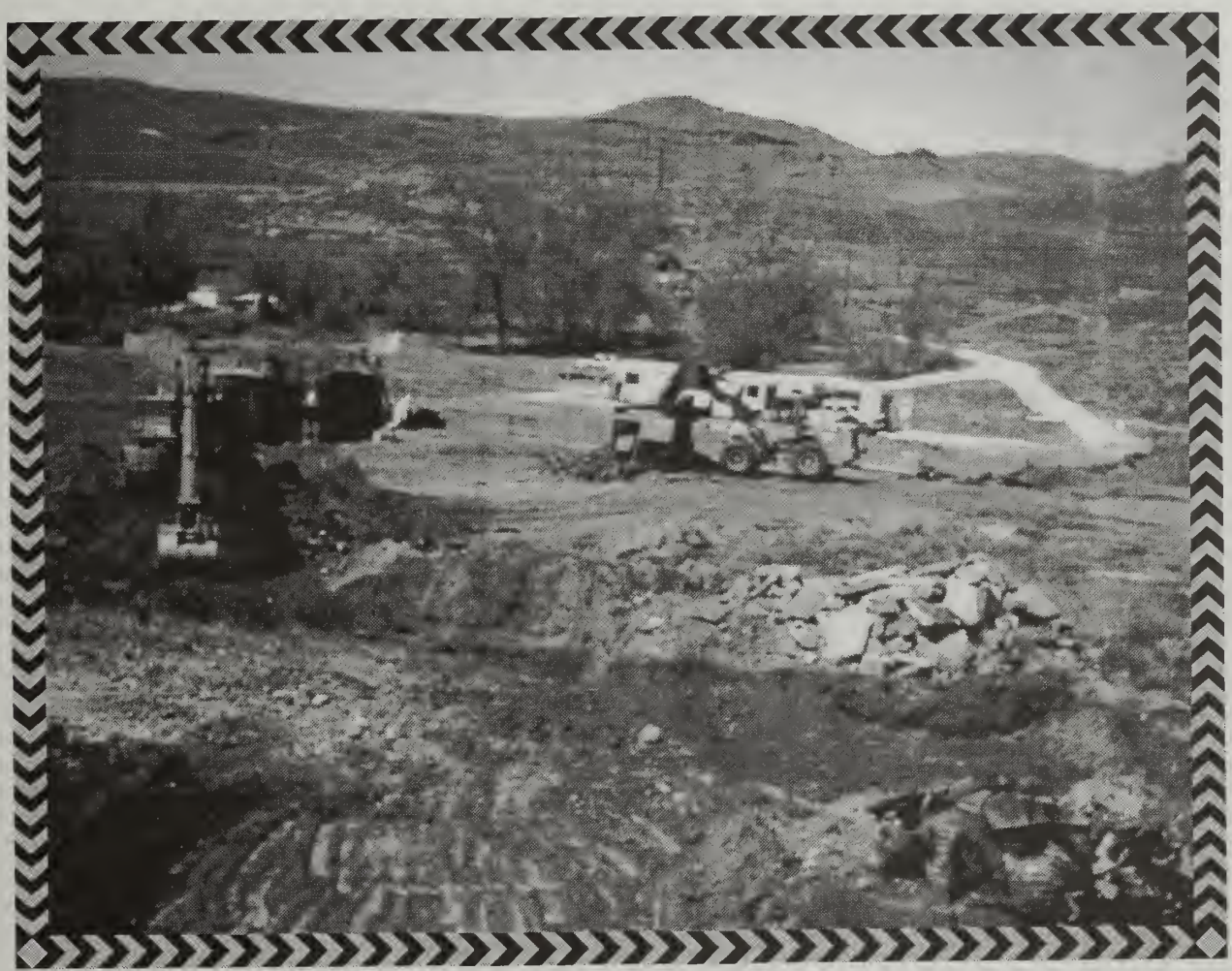
Monite Explosives Factory: Interim Remedial Action Project Summary

Technical Note 402



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Monite Explosives Factory: Interim Remedial Action Project Summary

Technical Note 402

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INTRODUCTION

The Monite Explosives Factory site is located along a canal and adjacent to homes in Sparks, Nevada (Figure 1). The site is on public land administered by the Bureau of Land Management's Carson City District. BLM initiated cleanup of the site after determining that the site posed an imminent threat to human health and the environment and that no parties responsible for contamination of the site existed. This report was prepared to provide information that could assist cleanup of similar sites in the future and to compare the original statement of work versus the modifications made during the actual cleanup. The report also provides a summary report to Washoe County and other interested parties.

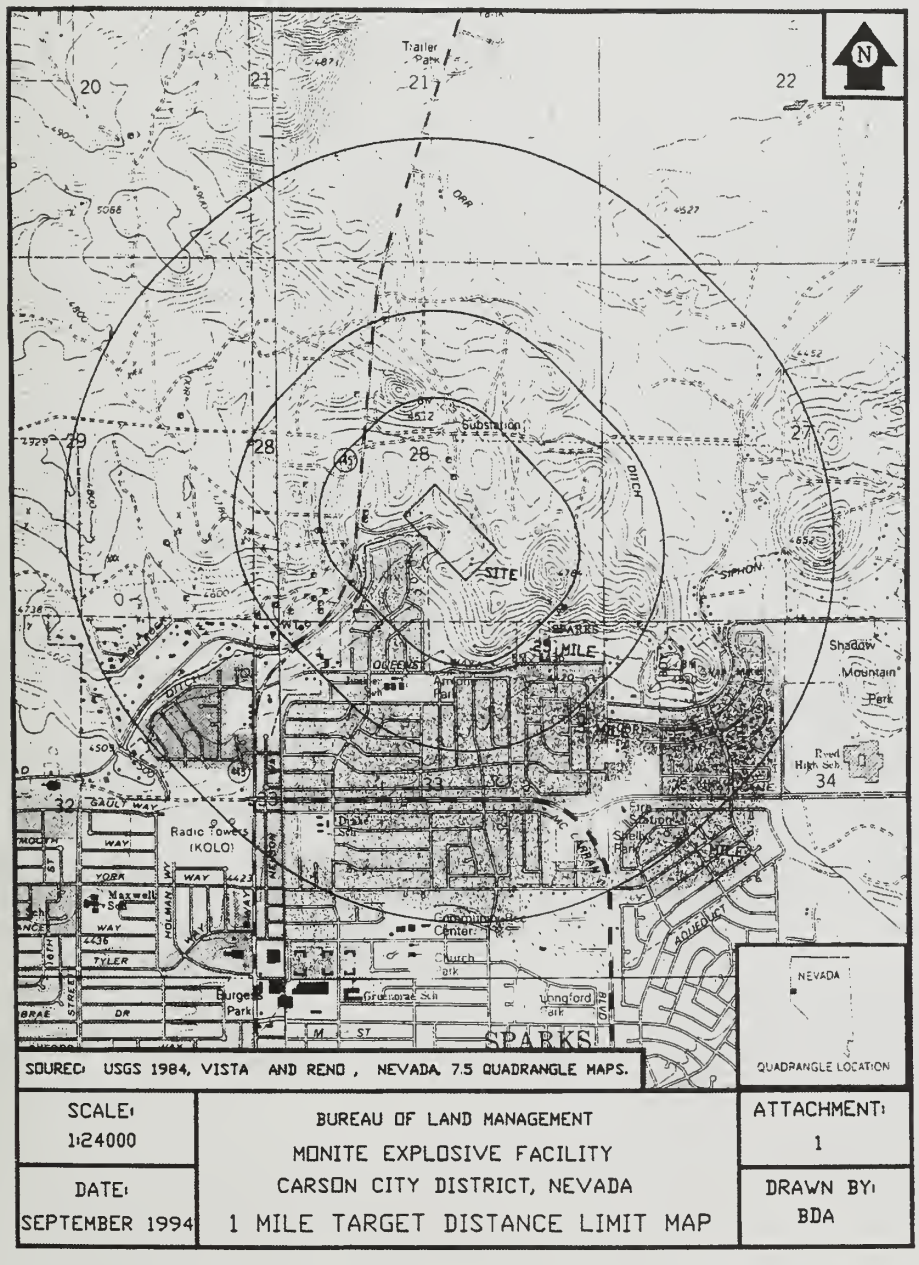

Figure 1. *The Monite Explosives Factory site is located along a canal and adjacent to homes in Sparks, Nevada.*

SITE HISTORY

The Monite Explosives Factory started manufacturing explosives sometime in early 1930. Records indicate that construction on the facility may have started in the late 1920s. The facility changed names several times. It was originally named Monite Explosives, Inc. and was managed by E.H. Hamlin from 1927 to 1932. From 1932 to 1935, it was Rocky Mountain Explosives, Inc., and then from 1935 to 1938, Explosives, Inc. There is no listing for the facility after 1938 until 1948 when the name again changed to the International Explosive Company.

Information concerning the explosive agent at this facility is not available, but it is believed to have been nitroglycerine based. A 1930 newspaper article indicated that the Monite explosives differed materially from dynamite in order to make the product easier to handle. Monite explosives may have been a mixture of nitroglycerine and 2,4-dinitrotoluene (DNT), a compound used in some explosive mixtures in 1931. High levels of dinitrotoluene were found on the site in 1992.

The manufacturing process at the Monite Explosives Factory consisted of material assembly, dehydration, grinding, mixing dry material with oils, loading material in paper shells, a paraffin dip, and final packaging. The sizes of the explosives manufactured ranged from 7/8 to 1 1/4 inches in diameter and the standard 8 inches in length. Small conveyors on mine rails transported the packaged explosives from the plant to the warehouse, which was located on-site.

Additional information on historical site operations was obtained through interviews with former employees. The employees indicated that during the mid-1950s the site received and dismantled military ordnance. The ordnance was reportedly from the Hawthorne Naval Munitions Plant and included depth charges and other naval ordnance. These were cut open and the explosives and the trinitrotoluene (TNT) were hammered out. The explosive materials generated through the dismantling process were repackaged and shipped off-site. According to a former caretaker of the facility, operations ceased around 1955 or 1956.

During the mid-1970s, the facility was dismantled during scavenging operations, but the exact date of dismantling is uncertain. Structures have been reduced to several cement foundations and numerous piles of debris have been scattered throughout the site. Analysis of historical aerial photography indicates that site activities may have continued beyond 1956.

Environmental concerns stemming from past operations include widespread surficial soil contamination and explosives buried or discarded on-site.

PREVIOUS WORK

In 1992, children playing on the site discovered a drum containing approximately 320 pounds of what was determined to be DNT. The materials were removed by personnel from the City of Sparks/Reno Bomb Squad, Washoe County Health Department, and the BLM's Nevada State Office. Bomb squad personnel secured the drum and transported it approximately 25 miles north of town. An explosive charge was placed on the drum and detonated.

On August 11, 1993, BLM personnel collected 14 soil samples from the site for laboratory analysis. The locations were selected based upon historic aerial photographs and areas of visible contamination. Aero-Jet Analytical Laboratories used a modified U.S. Environmental Protection Agency (EPA) Method 8330 to identify and quantify the contaminants present. The analysis indicated the presence of TNT at levels up to about 50,000 ppm; 2,6-DNT at up to 3,600 ppm; and 2,4-DNT at up to 5,100 ppm. Based upon results of this sampling, the area of contamination was fenced.

On November 16 and 17, 1993, BLM Service Center and Carson City District personnel, in conjunction with Washoe District Health Department officials, collected and analyzed 92 soil samples for the presence of TNT at the site. During this activity, sampling personnel collected 70 samples from a grid. Samples were collected from grid points spaced on 20- to 40-foot centers over a 1-acre parcel that formerly housed the manufacturing facilities.

BLM analyzed the samples for TNT and related compounds using a field screening technique called the ENSYS Soil Test System. The resulting values indicated maximum concentrations above the 100 ppm detection maximum for site soils. Several hot spots of TNT-related compounds were mapped as a result of this investigation, including localized zones outside the fenced areas. It was determined that the field screening method requires dilutions for concentrations greater than 300 ppm.

Eleven additional soil samples were collected from points other than the grid locations. BLM personnel focused these sampling efforts in areas of stained soils within what is now the larger fenced enclosure. Sample depths for these locations ranged from 6 inches to 24 inches deep. Information gathered as a result of this effort indicated the presence of TNT and related compounds at depths up to 24 inches deep.

In the spring of 1994, children playing onsite found 3.5 pounds of a crystalline material that was believed to be 2,4-DNT. The Reno/Sparks Bomb Squad responded. An explosive charge was placed on the crystalline material and detonated in place on April 4, 1994. BLM then fenced an additional area where the chunk of crystalline material was discovered and attempted to limit vehicular traffic to the site through the placement of large rocks along some of the site boundaries. Initially, signs within the fenced area were stolen, indicating that access had not been effectively restricted. Although the fences deterred access to the areas of highly contaminated soils, pedestrian, all-terrain vehicle (ATV), and bicycle traffic continued across the unfenced portions of the site.

Unauthorized, indiscriminate dumping was evident throughout the site when it was first discovered, and typically consisted of municipal wastes such as boilers, scrap metal, whiteware (e.g., sinks), and car bodies. Most of the waste and debris were removed prior to a geophysical survey conducted in 1994.

In October 1994, BLM's contractor (CCJM) conducted a preliminary assessment at the Monite Explosives Factory as required by the National Contingency Plan. The preliminary assessment included establishing a sampling grid that encompassed approximately 7 acres. Samples were collected at 25-foot intervals across the entire grid. A total of 894 soil samples were collected and analyzed using the ENSYS field screening method with dilutions; 15 were collected and analyzed for the full EPA Contract Laboratory Program (CLP) Target Analyte List (TAL) inorganics and Target Compound List (TCL) organics; and 152 samples were analyzed for explosives using EPA Method 8330. Concentrations of DNT of up to 6 percent and TNT levels up to 5 percent were found in site soils. In addition, small yellowish crystals were analyzed and found to contain approximately 10 percent DNT.

In April 1995, the Washoe County Health District issued a health order against BLM to assess and remediate the Monite site. An Engineering Evaluation/Cost Analysis (EE/CA) was completed in July 1995 that further defined the area of contamination and volume of contaminated soil. The EE/CA also evaluated contaminated soil disposal options consisting of off-site incineration/landfill, off-site biotreatment, on-site windrow composting, and on-site slurry phase biotreatment. A Community Relations Plan was developed that helped inform nearby residents and city officials of the options available. Citizens preferred removal of the contaminated soil off-site through either incineration, disposal, or bioremediation. The Center for Disease Control reviewed the EE/CA and agreed with the health based cleanup levels in the report.

Once the EE/CA provided cleanup cost estimates, funding through the Department's Central Hazmat Fund was sought out and approved. Use of the Central Hazmat Fund was strongly supported once the Bureau's toxicologist notified the BLM Director of the health risks at the site and Washoe County issued their health order.

A contract solicitation was issued in 1996 that requested bid proposals for any or all of the previously listed disposal options. A technical proposal evaluation committee was convened to evaluate bid proposals. The incineration/landfill option was selected because of a number of benefits, which included lower than expected incineration costs and immediate removal of waste from the site to satisfy concerns of nearby residents and the Washoe County Department of Health.

MONITE REMEDIATION WORKPLAN SUMMARY

This section describes the work originally proposed to be performed to complete the interim remedial action. The objectives of the interim remedial action were to safely locate and remove magnetic anomalies in the two fenced areas at the site, to excavate soil at the site containing greater than 6.6 ppm total nitroaromatics (DNT + TNT), and to properly dispose of excavated soil. Based on human health risk assessment, 6.6 ppm was chosen as the site cleanup level. Soil containing greater than 140 ppm DNT is land-banned and must be incinerated, while TNT is not land-banned. Based on site characterization, soil containing between 8.8 and 140 ppm DNT is classified as hazardous waste not land-banned and may be disposed of at an RCRA landfill. Soil with DNT contamination between the 6.6 ppm cleanup level and 8 ppm DNT is classified as solid waste.

Based on the results of previous soil investigations at the site, it was estimated that approximately 1,050 cubic yards of contaminated soil would need to be excavated for disposal. The volume of soil was estimated based on the assumption that one cubic yard of soil in situ expands to 1.3 cubic yards of excavated soil, with 1.15 tons/cubic yard of excavated soil.

For cost estimating, the contract provided for incineration of 600 cubic yards of soil containing greater than 140 ppm DNT, disposal of 300 cubic yards containing between 8 and 140 ppm DNT to a hazardous waste landfill (waste code D030), and disposal of 150 cubic yards containing between 6.6 and 8 ppm DNT to a solid waste landfill.

Site Mobilization and Preparation

About 1/4 mile road was to be graded and graveled to enable site access by trucks and heavy equipment. The site perimeter was to be secured by chain link fencing and warning signs. Soil berms were to be placed around three sides of the area where contaminated soil was to be stockpiled and the area was to be lined with 60 mil high density polyethylene.

Geophysical Resurvey

A geophysical resurvey was to be conducted to locate and map suspect surface and subsurface anomalies. The contract stated that it was expected that a total of 22 geophysical anomalies would need to be excavated.

Previous geophysical surveys indicated that underground storage tanks (USTs) could be encountered during the anomaly excavation and removal process. The workplan provided for characterization, excavation, removal, and transportation to an appropriate disposal facility. If soil contamination was observed to have taken place as a result of a leak from a UST, the impacted soil was to be excavated, characterized, and transported to an appropriate disposal facility.

Grid Layout, Sampling, and Excavation Plan

A grid pattern (20-foot squares) was to be established in both fenced areas to facilitate soil sampling and excavation. Areas A, B, and C, as shown in Figure 2, were identified and marked. Based on the results of previous site investigations, soil located in Areas B and C was known to be contaminated with TNT/DNT, with Area C the most highly contaminated (likely containing soil with greater than 140 ppm TNT/DNT); Area B as moderately contaminated (likely containing soil with concentrations of TNT or DNT greater than 6.6 ppm but less than 140 ppm); and area A as least contaminated. All

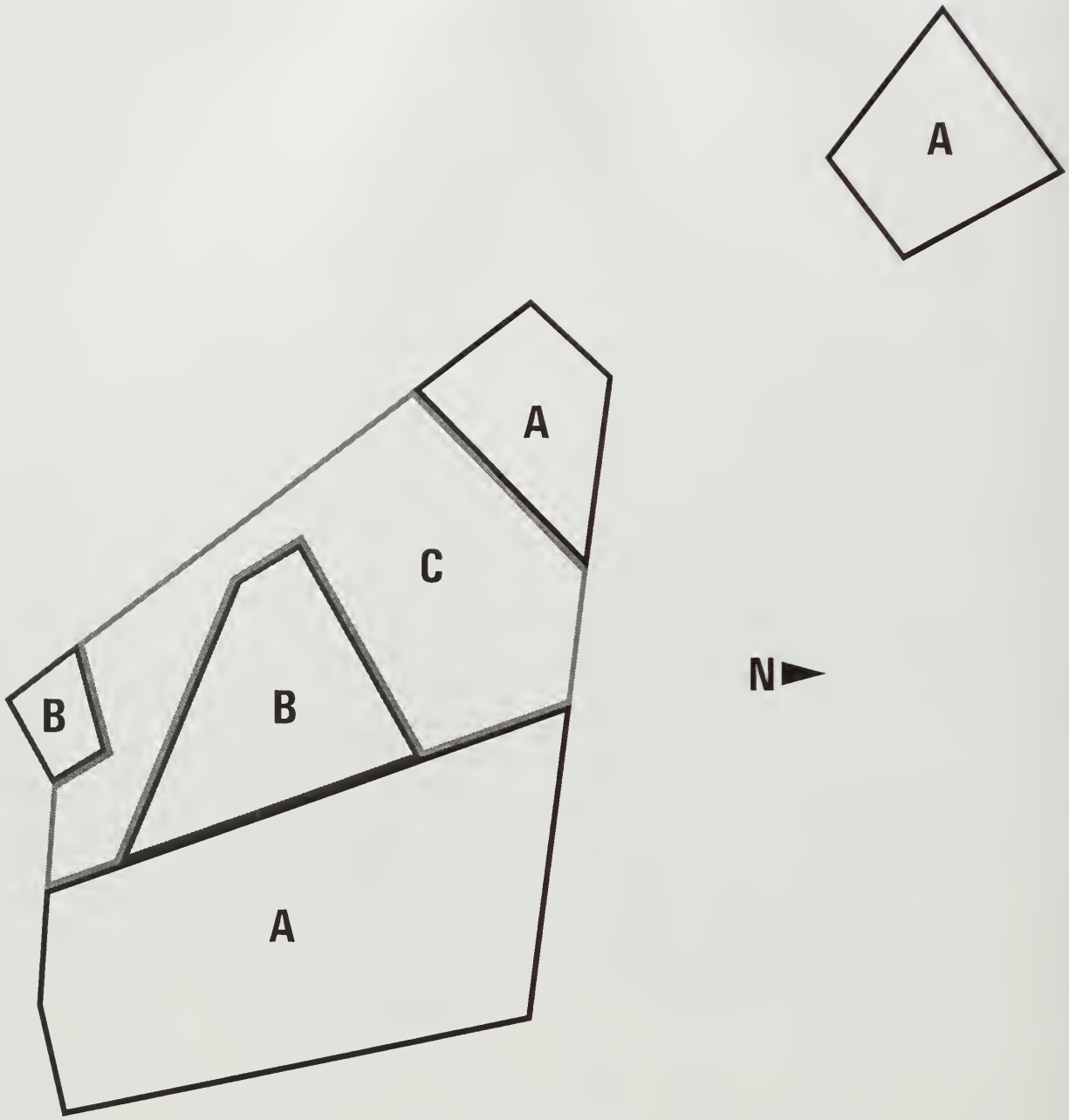

Figure 2. Zones of low (A), moderate (B), and high (C) soil contamination at the Monite Explosives Factory.

soil in areas B and C was to be excavated to a depth of 1 foot prior to sampling. Area A was to be gridded, and only the grid cells having contamination above 6.6 ppm DNT/TNT were to be excavated.

One 2-ounce sample was to be collected from the center of each 20-foot grid square and analyzed for total DNT/TNT using a colormetric chemical field screening method (the ENSYS test).

Soil from all grid squares in which the concentration of DNT/TNT had been identified as greater than 6.6 ppm was to be excavated in 1-foot lifts. After each 1 foot of excavation, a sample was to be collected for ENSYS analysis. Soil from all grid-squares was to be excavated until all soil with a concentration of greater than 6.6 ppm DNT/TNT was removed.

Soil Confirmation Sampling/Analysis

Twenty-five percent of the ENSYS confirmation samples were to be analyzed in the laboratory for nitroaromatics by EPA Method 8330.

Demolition and Disposal of Remaining Site Structures

The remaining concrete structures were to be demolished once soil excavation was complete. All recovered debris was to be washed with water on a decontamination pad. The material was to be laboratory tested for the presence/absence of nitroaromatics by EPA Method 8330. If nitroaromatic concentration was less than 6.6 ppm, the rocks and debris were to be returned to the excavation site. The concrete debris was to be transported to the local RCRA Subtitle D landfill.

Stockpile Cell Construction, Soil Handling Procedures, and Stockpile Sampling

All excavated soil was to be run through a vibratory screen to remove objects greater than 1/4 inch in diameter. All soil excavated during site activities was to be placed into three or more stockpiles for disposal purposes. Stockpile soil samples were to be collected to meet landfill requirements so that the appropriate disposal alternative could be selected. Soil stockpiles were to be covered with plastic at the end of the day.

Soil Disposal

Upon characterization, all soil was to be loaded into covered-end dump trucks and hauled to the appropriate disposal facility.

Backfill, Grading, and Revegetation

Clean fill was to be imported as needed to backfill the excavation to surrounding grade. A mix of sandy, decomposed granite and organic material was chosen. After matching the original grade, compaction was to be accomplished by driving the loader over the site. After the excavation had been backfilled, the site was to be restored to its original grade, and vegetation was to be restored by hydroseeding.

AS DONE WORK AND CONTRACT MODIFICATIONS

This section describes modifications to the workplan that were made during the field activities. The pre-work conference was held and notice to proceed issued on October 18, 1996. Mobilization, road improvements, and site preparations were completed during the last week of November and the first week of December 1996.

The fenced portion of the site was divided into areas of high (Area C), moderate (Area B), and low (Area A) contamination as shown in Figure 2. To reduce the spread of contamination, vehicular traffic was limited to designated routes within the contaminated areas.

The geophysical resurvey was initiated and 70 anomalies were located, whereas the EE/CA had reported 22 anomalies. It became apparent that the sensitivity of the magnetometer used to do the EE/CA survey was set at a level that would detect only larger objects. Since explosive objects can be quite small, the unexploded ordnance (UXO) team excavated all 70 objects by hand digging to determine the material and then removed them by hand or backhoe. Deeply buried objects were partially uncovered by the backhoe prior to hand digging to expose the object. Most of the material consisted of pipe and scrap metal, although notably, a complete depth charge casing and hundreds of matching gaskets were found. The depth charge casing was turned over to BLM law enforcement officials under chain-of-custody as evidence for potential cost recovery. No unexploded ordnance or USTs were found during the excavation of geophysical anomalies. Magnetometer surveys cannot differentiate between USTs and piping.

Portions of the buried pipe wrapped with asbestos and other asbestos-containing materials were found at the site resulting in a contract modification to include removal and disposal of asbestos-containing materials. The asbestos was a continuing problem during the excavation. When asbestos was found in the vibratory screen, the health and safety plan was amended to include air quality monitoring for asbestos at the site perimeter and on personnel, along with the use of respirators. Low levels of asbestos were recorded at the perimeter. The personal air quality monitors confirmed the need for respirators. Asbestos abatement consisted of sampling, removing asbestos wrap from pipes, and gathering loose material. Asbestos-containing material was double-bagged, sealed with duct tape, and disposed of as solid waste at a local landfill under permit from Washoe County.

Soil Excavation Screening and Sampling

After removal of the geophysical anomalies, the site was laid out into 20-foot grid cells. Areas B and C, known to have widespread contamination, were stripped of 1 foot of soil prior to sampling. Area C was gridded, sampled, and areas of contamination >6.6 ppm were excavated.

The workplan called for a 2-ounce sample in the center of each grid. A 10-gram portion was removed from the top of the sample jar

for ENSYS analysis. The single sample from each grid cell and lack of sample mixing was not resulting in analyses consistent with previous work. The sampling method was changed to collect four 2-ounce samples roughly equally spaced in the grid cell. The four samples were composited by mixing on a clean piece of plastic. This significantly improved consistency and repeatability of samples. Laboratory splits were taken from the samples to verify repeatability. Most often, splits and duplicates were selected on the basis of being near the 6.6 ppm cleanup standard.

When excavation and screening of soil commenced, it was immediately apparent that the 1/4 inch screen was too small, as evidenced by 90 percent of the material (rock and soil clods) ending up in the rubble pile that was supposed to be solid waste. The screen size was increased to 1 inch, which reduced the amount of rubble to about 25 percent by volume.

The 1,050 cubic yard volume of contaminated soil that was contracted to be removed was originally estimated as covering 0.57 acre, at an average depth of 1.2 feet, and a depth range of 1 to 4 feet.

Wet weather in December 1996 and January 1997 saturated the soil on-site and forced a shutdown until April 1997. Even though it was quite dry from January until April, clayey zones in the contaminated soil were very wet and did not break up in the screen. A different screening machine was tried that had hammers to break up the material; however, clays in the soil were sufficiently plastic to defy efforts to break them up. This resulted in a 500 cubic yard rubble pile that had to be disposed of as hazardous waste.

Total nitroaromatic surface contamination prior to soil removal is shown in Figure 3 from the EE/CA. Figures 4, 5, and 6 show ENSYS sample results at 1, 2 and 3 foot depths, respectively. Grid cells 9E, 10E, and 12E were excavated to 4 feet and cell 7E to 7 feet. These grid cells and the majority of contamination were located adjacent to and below the buildings where explosives were handled. The area and depth of contamination varied little from estimates, however a 0.5 foot increase in the average depth of contamination, difficulty in precisely excavating a 20 foot x 20 foot x 1 foot cell with a large trackhoe, combined with the large volume of rubble from screening, increased the total volume of soil excavated for disposal to 2,568 cubic yards (versus the 1,050 cubic yards predicted).

The ENSYS test determines total nitroaromatics that in this situation includes DNT plus TNT. The ENSYS test is colormetric with a maximum value of 300 ppm. The solution can be diluted to obtain results for concentrations above 300 ppm.

Each grid cell was excavated 1 foot and sampled with the intent that the grid cell sample would allow one grid cell volume of soil to be screened and stockpiled by concentration. In practice, the process of excavating to an intermediate stockpile with a trackhoe and then using an end loader to feed the soil to the screen was mixing soil from numerous grid cells. Also, ENSYS sampling showed that the soil excavated from Areas B and C were not consistently highly contaminated (>140 ppm) or moderately contaminated (8<140 ppm), respectively. In an attempt to correct these deficiencies, the contract was modified to provide for an ENSYS sample of each 25 cubic yards of soil from the vibratory

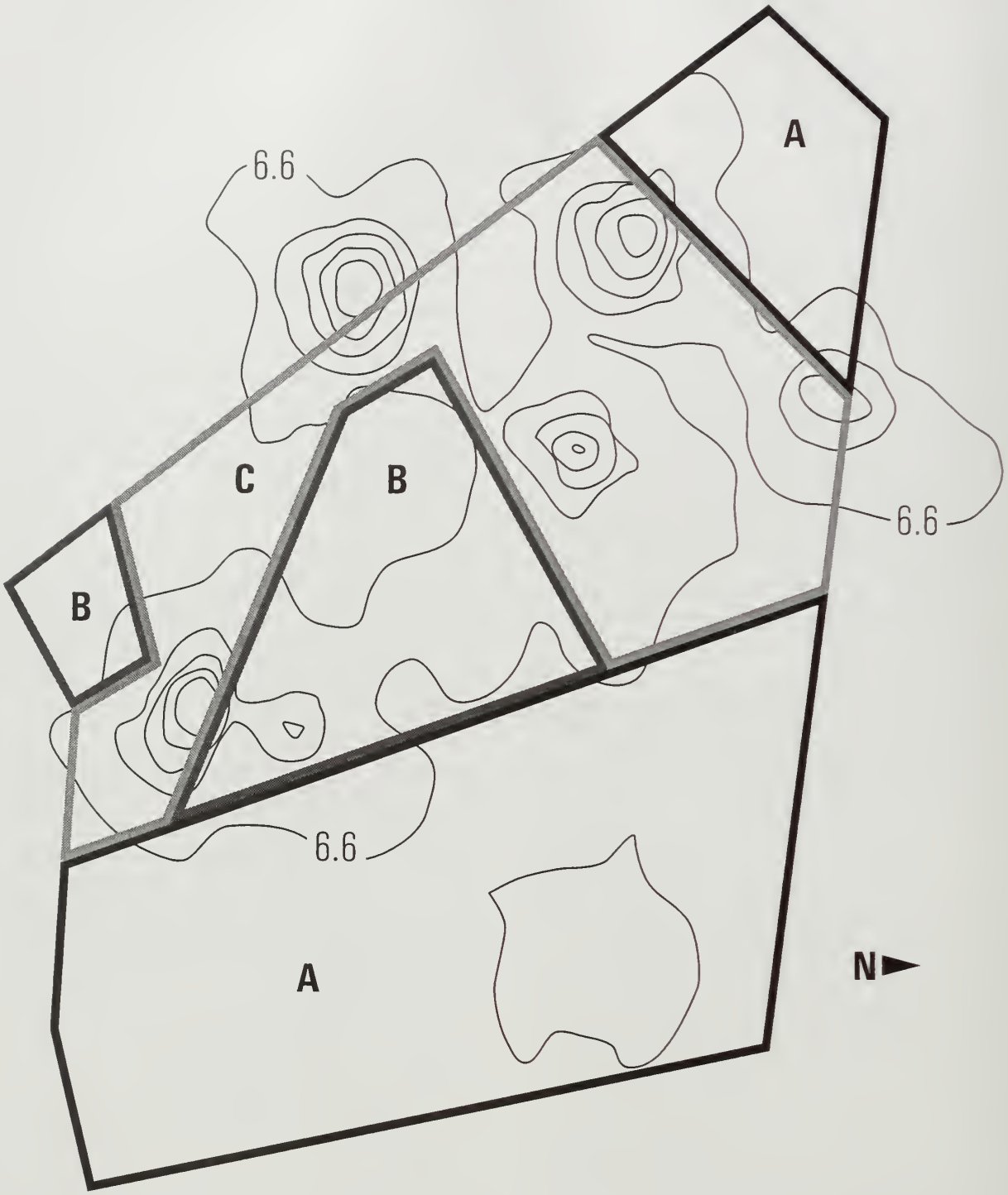

Figure 3. EE/CA surface sampling total nitroaromatics (ppm); contour interval + 3,000 ppm.

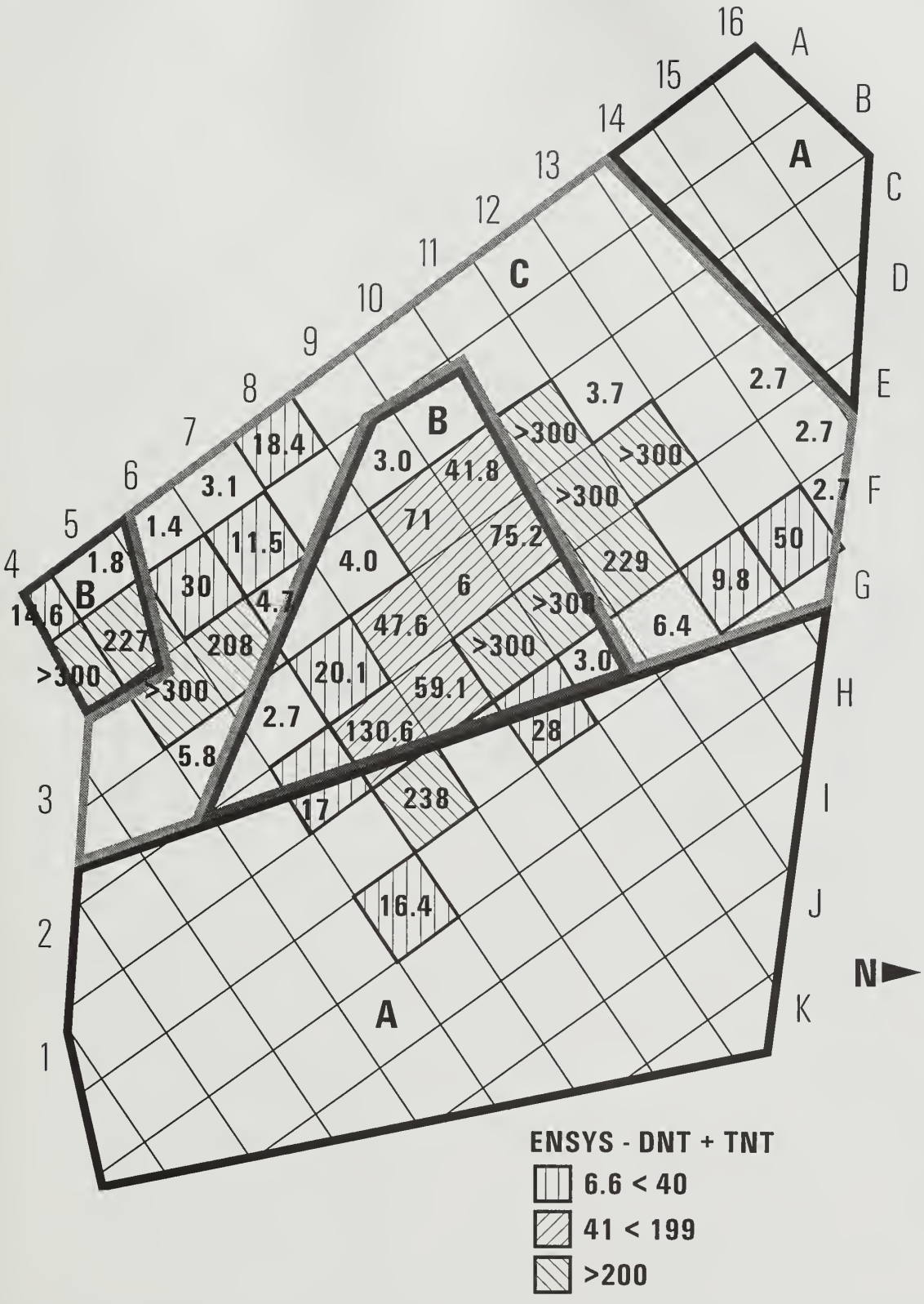

Figure 4. *Total nitroaromatics (ppm) at 1 foot soil exavation depth.*

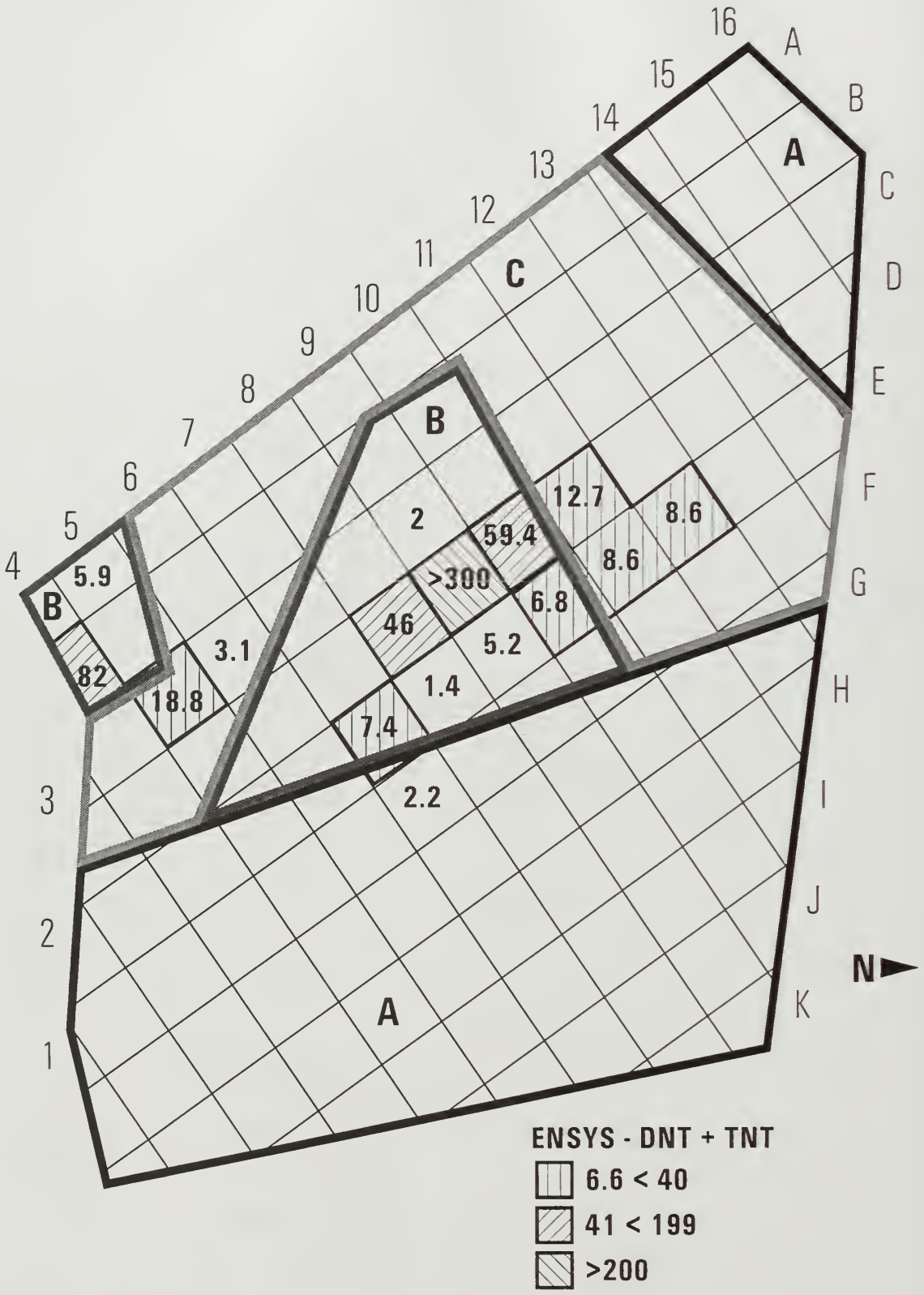

Figure 5. Total nitroaromatics (ppm) at 2 foot soil exavation depth.

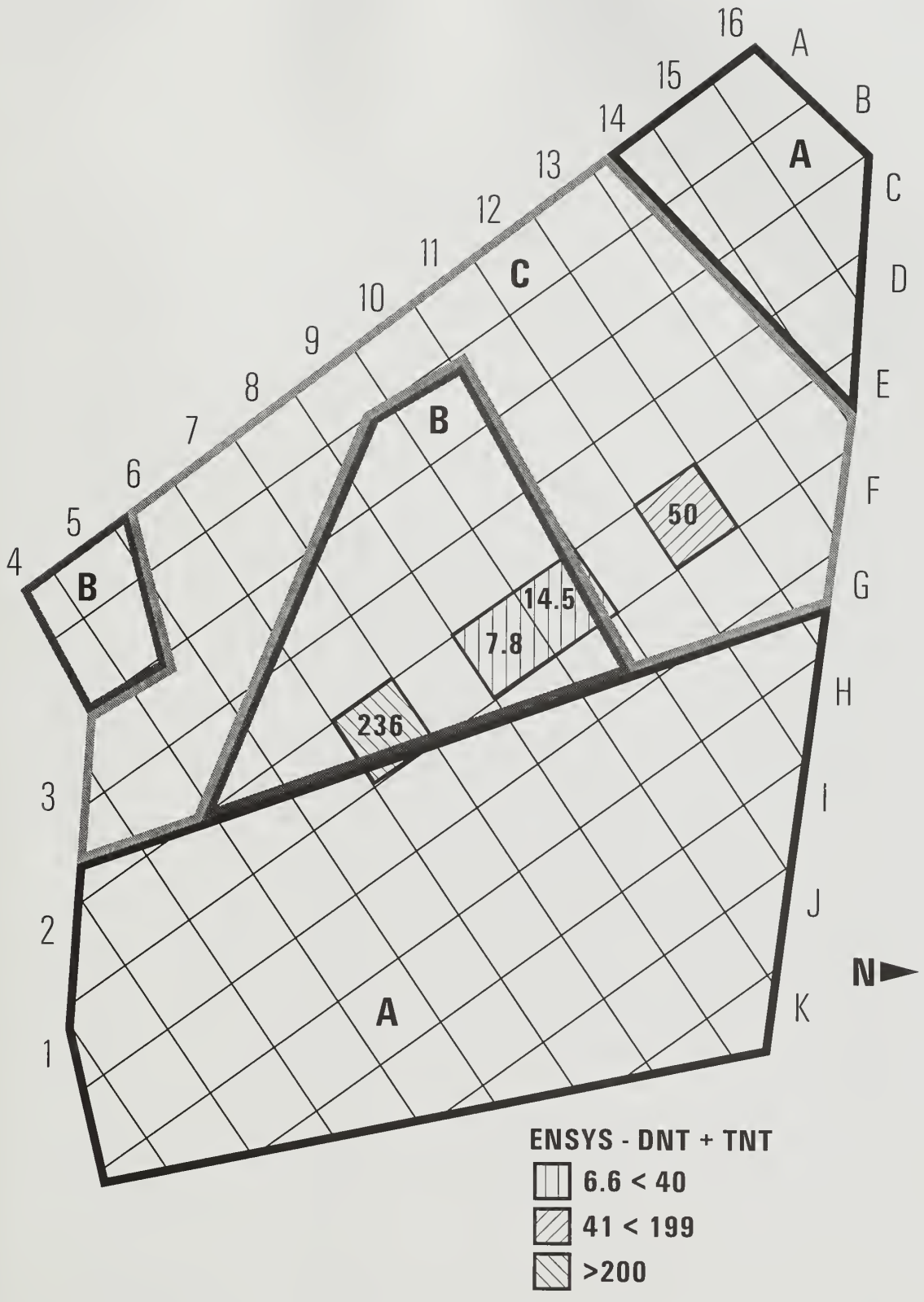

Figure 6. *Total nitroaromatics (ppm) at 3 foot soil exavation depth.*

screen. Splits from 4 of the 25-yard samples were composited as profile samples for disposal. Each 25 cubic yards was stockpiled separately until the ENSYS result was known, usually about 1 hour. The material was then moved to the appropriate stockpile for disposal. As shown in Table 1, 33 screen samples had results >140 ppm DNT and 20 samples had results <140 ppm DNT.

Table 1. *Screen Sample Results.*

Screen Sample #	ENSYS Result-ppm	Screen Sample #	ENSYS Result-ppm
SCR-2	112.7	SCR-20	>300
SCR-4	14.7	SCR-21	>300
SCR-5	90	SCR-23	>300
SCR-10	25.3	SCR-25	>300
SCR-11	21.2	SCR-26	>300
SCR-12	23.9	SCR-27	>300
SCR-13	126.9	SCR-28	>300
SCR-15	14.5	SCR-30	>300
SCR-24	24.9	SCR-31	>300
SCR-29	58.8	SCR-33	>300
SCR-32	111	SCR-34	>300
SCR-1	234	SCR-36	289
SCR-3	250	SCR-37	250
SCR-6	209	SCR-38	65
SCR-7	159	SCR-39	153
SCR-8	>300	SCR-41	>300
SCR-9	170	SCR-42	261
SCR-14	206.8	SCR-44	>300
SCR-16	173	SCR-46	195
SCR-17	>300	SCR-45	108
SCR-18	>300	SCR-47	208
SCR-19	>300	SCR-49	155
SCR-50	>300	SCR-52	16.2
SCR-40	56	SCR-53	107
SCR-43	106	SCR-54	7.5
SCR-48	54	SCR-55	>300
SCR-51	104		

When results of the EPA Method 8330 profile samples were received (Table 2), it became apparent that the ENSYS procedure was not completely reliable in establishing stockpiles of contaminated soil in the desired categories of 8 to 140 ppm or >140 ppm total nitroaromatics. This problem did not have a significant impact on the cost of the project. As a result of the soil mixing inherent to the soil removal process, the DNT concentration in the stockpiles averaged 52.2 ppm DNT and the soil was sent to a hazardous waste landfill. The soil was disposed of as dinitrotolulene-contaminated waste (code D030) and the volume was 2,568 cubic yards.

Table 2. *Waste Profile Samples.*

Sample Number	ENSYS (4 samples) ppm DNT/TNT	Profile Sample-8330 ppm DNT+TNT
SP1-2 A&B	N/A	48 / 3.1
SP1-4 A&B	N/A	22 / 1.6
SP2-1 A&B	N/A	67 / 11
SP2-3 A&B	N/A	ND / 130
SP3-1	234, 250, 209, 159 average 213	58 / 12
SP4-1	112.7, 14.7, 90, 25.3 average 60.7	24 / 9.1
SP4-2	21.2, 23.9, 126.9, 14.5 average 46.6	25 / 5.6
SP3-4	all >300	64 / 620
SP3-2	>300, 170, 206.8, 173	150 / 57
SP3-3	all >300	64 / 25

NA-not analyzed
ND-non detect

EVALUATION OF RESIDUAL CONTAMINATION LEVEL

Verification samples were collected from the bottom of the excavation to verify that the cleanup standard had been attained. Upon completion of excavation, ENSYS results for 34 grid cells were non-detect at maximum depth and 22 grid cells had measurable total nitroaromatics below the 6.6 ppm cleanup standard. EPA Method 8330 analysis was performed on sample splits from 12 of the 22 grid cells with detectable nitroaromatics at maximum excavation depth as shown in Table 3. The confirmation analysis by EPA Method 8330 did not change any grid cell from below the cleanup standard to above the standard. Of the 15 samples from the maximum excavation depth analyzed by both ENSYS and EPA Method 8330 (Table 3), 5 EPA Method 8330 analyses were greater, 5 ENSYS results were greater, and 5 results were equal. The detection limit for the ENSYS test is 1 ppm total nitroaromatics. If _ the detection limit is assigned as the value for non-detect grid cells, the mean residual contamination level for the areas excavated is 1.54 ppm total nitroaromatics with a standard deviation of 1.6. Based on these data, it can be safely concluded that the cleanup attained a final total nitroaromatics concentration considerably less than 6.6 ppm.

Table 3. Comparison of ENSYS analysis with EPA Method 8330 analysis.

Sample Number	ENSYS Result	Method 8330 DNT/TNT
5C-3	ND	1.5/ND
6D-1	2.7	3.5/1
7B-2	ND	ND/ND
7E-2	7.4	4.4/2.6
7F-2	2.2	ND/1.4
8A-2	ND	ND/ND
8D-2	2.0	1.0/10
9C-2	2.0	.38/1.0
9D-1	6.0	1.2/2.3
9E-4	1.6	.55/5.4
10B-1	ND	ND/ND
10E-4	1.1	ND/1.1
11E-3	ND	ND/0.46
12A-1	ND	ND/ND
12E-4	2.2	ND/1.1

Underlined samples were collected from the maximum depth of grid cell excavation. The last number in the sample number is the depth in feet.

LESSONS LEARNED

Lessons learned from the Monite experience where soil contamination is not always visible include the following:

- Preliminary volume estimates may differ significantly from final removal volumes based on accuracy of sampling information, ability of equipment and operator to remove precise cell volumes, soil processing, contamination of transport routes, amount of debris, and weather problems. All of these variables tend to increase removal volumes.

- The Monite experience was somewhat unusual because of the need to pass all of the soil through a screen to detect explosive DNT crystals. This caused a bottleneck and tended to prevent perfect segregation of waste piles based on field screening results. This was solved by sampling every 25 cubic yards exiting the screen.

- Field screening can be used to classify waste volumes for disposal and for verification sampling, but must be confirmed with an appropriate number of laboratory analyses. These samples must be true splits to enable comparability.

- The close working relationship between the contracting officer and the contracting officer representative/project inspector resulted in negotiations where waste disposal costs were reduced despite the increased volumes of soil and were kept within budget.

- The daily on-the-ground coordination with the Washoe County Health District and excellent regulatory working relationship helped quickly address the unforeseen problems and kept the project on track and within cost targets.

- Close coordination and communication with nearby residents early on avoided controversy and provided the support to quickly conduct the remediation.

CONTRACT COST SUMMARY

The contract for remediation of the Monite Explosives Factory site was awarded for $841,847 and completed for $899,975. The elimination of disposal by incineration reduced the cost by $516,845. Disposal costs at an RCRA Subtitle C landfill increased from $93,360 for disposal of 300 cubic yards to $521,200 for disposal of 2,568 cubic yards. Costs for sampling increased from $13,997 to $62,289. Weather delays increased mobilization costs from $13,175 to $20,090. Unplanned costs were incurred for asbestos abatement in the amount of $1,060, the Washoe County requirement for site security during nonworking hours of $34,330, repair of weather damage to the site facilities of $1,925, and upgrade of soil stockpile liner at a cost of $1,881.

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12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The Monite Explosives Factory site is located along a canal and adjacent to homes in Sparks, Nevada. The site is on public land administered by the Bureau of Land Management's Carson City District. BLM initiated cleanup of the site after determining that the site posed an imminent threat to human health and the environment and that no parties responsible for contamination of the site existed. This report was prepared to provide information that could assist cleanup of similar sites in the future and to compare the original statement of work versus the modifications made during the actual cleanup. The report also provides a summary report to Washoe County and other interested parties.

14. SUBJECT TERMS

- Monite
- Explosives
- EPA Method 8330
- Dinitrotoluene (DNT)
- Trinitrotoluene (TNT)
- Nitroglycerine
- RCRA landfill
- Hazardous waste
- Human health risk assessment
- Nitroaromatics
- Remediation

15. NUMBER OF PAGES

28 including covers

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
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